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New distribution records of *Pithecia rylandsi* and *Pithecia mittermeieri* (Primates, Pitheciidae) and an updated distribution map

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Abstract: New locations and extension of the known geographical distributions are reported for two recently-described species of saki monkeys: *Pithecia rylandsi* and *Pithecia mittermeieri*. The record of *P. rylandsi* confirms the presence of this species further south in the state of Mato Grosso, Brazil. The new record of *P. mittermeieri*, which occurred in an ecotone of Amazon, Cerrado, and Pantanal biomes, is the southernmost record for the genus. Recording the distribution extension of both species is essential for their conservation, as well as to promote more studies about their ecology, behaviour, and other unknown aspects of *Pithecia*.

Key words: Amazonia; saki monkeys; southernmost record; species distribution; cerrado conservation

The genus *Pithecia* was recently revised by Marsh (2014). In this review, she recognized 16 monotypic species, five of which were described for the first time. Among these five new species, four are found in Brazil: Pissinatti's Bald-faced Saki (*Pithecia* pissinattii), Cazuza's Saki (*Pithecia* cazuzai), Rylands' Bald-faced Saki (*Pithecia rylandsi*), and Mittermeier's Tapajós Saki (*Pithecia mittermeieri*).

Pithecia rylandsi Marsh, 2014 occurs in the southern Amazon, in Brazil, Bolivia, and Peru. Marsh (2014) listed localities in the Pando region of northwest Bolivia, in the province of Nicolás Suárez (Bolivia), south of the Acre River, near the Peruvian and Brazilian borders (including the Tahuamanu and Nareuda rivers) and in Peru, west of the Los Amigos Conservation Concession and Los Amigos River (at least as far as the Manu Wildlife Center at the mouth of the Alto Madre de Dios River) and in a northerly direction of the Madre de Dios River. Specimens collected by J. Natterer in 1829 indicated that this species occurs in the central-west region of the Brazilian states of Rondônia and Mato Grosso, near the Bolivian border (delimited by the Mamoré–Guaporé rivers).

Pithecia mittermeieri is endemic to Brazil, and part of its distribution entails what was previously assumed to be the range of *P. irorrata* (Hershkovitz 1987; Marsh 2014). This species is distributed south of the Amazonas River between the Madeira and Tapajós rivers, including the drainage of the Aripuanã River, and extends into Rondônia, east of the Madeira and Mamoré Rivers, as well as the Guaporé River. Localities in Rondônia include Destacamento do Ribeirão and Pacáas Novos River, located east of the Mamoré River; specimens from both localities were collected by J. Natterer in 1829.

On 7 December 2013 one adult male of *P. rylandsi* was observed (15°00′48″ S, 059°37′31″ W) (Figure 1) and, on 3 December 2014, in the same forest fragment, two females

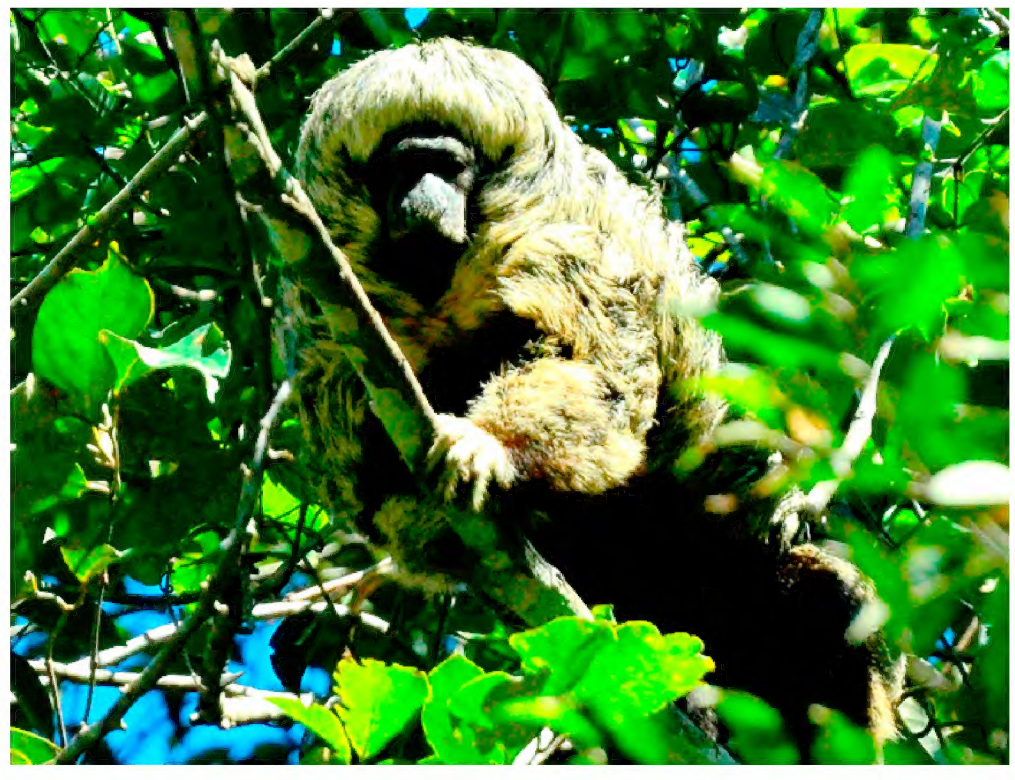

Figure 1. A male of *Pithecia rylandsi* recorded in a fragment of semideciduos forest in the rural municipality of Vila Bela da Santíssima Trindade in Mato Grosso, Brazil (Photo credit: André Valle).

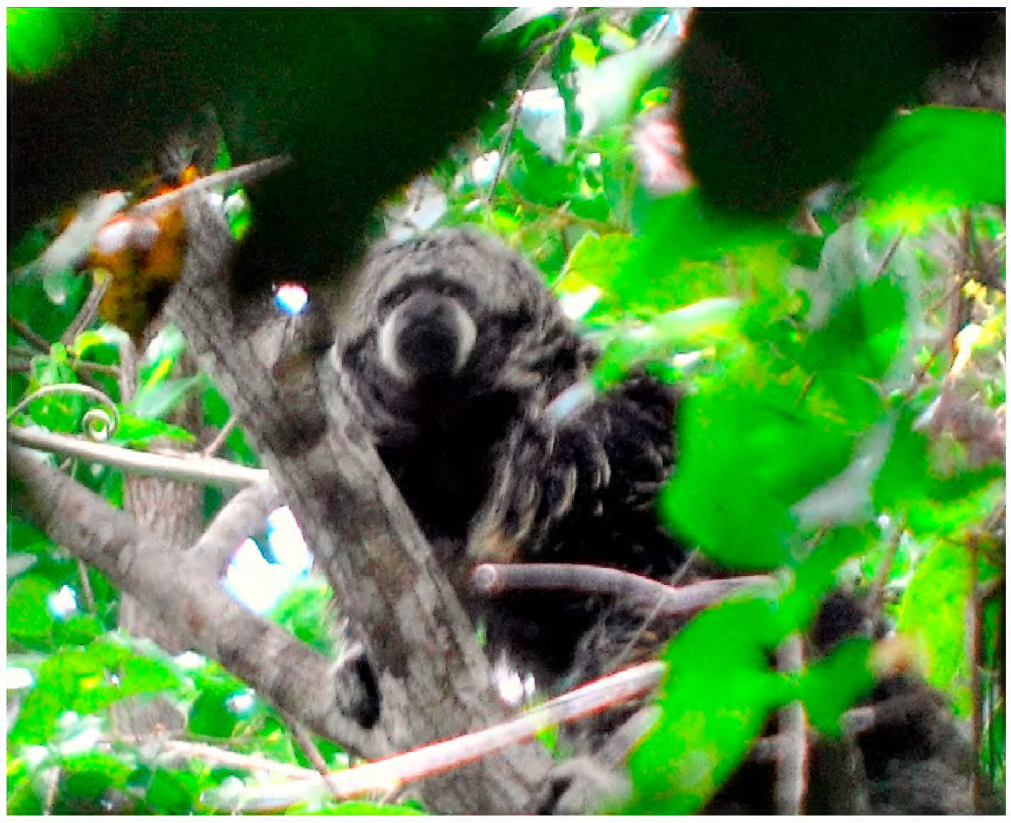

Figure 2. A female of *Pithecia mittermeieri* recorded in a Savanna Woodland fragment in the rural municipality of Lambari d'Oeste in Mato Grosso, Brazil (Photo credit: Aldes Lamounier).

of *P. rylandsi* were recorded. Both records occurred in the rural area of the Vila Bela da Santíssima Trindade municipality, in Mato Grosso, Brazil, in an area of Semi-deciduous Forest. The forest fragment was approximately 3,255 ha isolated in a matrix of agricultural and pasture lands.

On 22 November 2014, in the rural municipality of Lambari D'Oeste, two subadult females of *P. mittermeieri* were recorded (15°11′42″ S, 057°44′43″ W) (Figure 2) in a savanna woodland fragment of approximately 960 ha, located in the ecotone consisting of Amazon, Cerrado, and Pantanal biomes, surrounded by cattle ranching and soybean plantations. The observation occurred during the morning (ca. 11:30 am) and both females escaped when they noticed human presence.

The saki monkeys observed were identified based on their pelage pattern; the identification was later confirmed based on Marsh's (2014) revision of the genus, which stated that male *Pithecia rylandsi* have a bare face with very black pigmentation, predominantly gray pelage, which

Table 1. Occurrences records for *Pithecia rylandsi* and *Pithecia mittermeieri*, according to published data and the present study.

Site	Species	References	Location	Latitude (S)	Longitude (W)
1	*Pithecia rylandsi*	Marsh (2014)	Manu Wildlife Center	12°26′49″	070°37′16″
2	*Pithecia rylandsi*	Marsh (2014)	Concesión para Conservación, Los Amigos	12°26′38″	070°30′40″
3	*Pithecia rylandsi*	Marsh (2014)	Los Amigos Research Center	12°33′07″	070°15′40″
4	*Pithecia rylandsi*	Marsh (2014)	L. Porter Field Site	11°25′	069°01′
5	*Pithecia rylandsi*	Marsh (2014)	Mukden	11°00′	S, 069°06′
6	*Pithecia rylandsi*	Marsh (2014)	Río Nareuda	11°17′35″	068°49′55″
7	*Pithecia rylandsi*	Marsh (2014)	Rio Guaporé (approx. collection area both sides of river, Natterer 1829)	11°45′22″	065°01′37″
8	*Pithecia rylandsi*	Marsh (2014)	Mato Grosso (approx. collection area, Natterer 1826)	15°01′00″	059°57′
9	*Pithecia rylandsi*	Marsh (2014)	Vila Bela da Santíssima Trindade, Mato Grosso	15°00′48″	059°37′31″
10	*Pithecia rylandsi*	Marsh (2014)	Comodoro, Mato Grosso	13°42′39″	060°19′56″
11	*Pithecia mittermeieri*	Marsh (2014)	Amorin, Brabo, Limoatuba (Olalla collection, by gazetteer, Paynter Jr. & Traylor Jr. 1991)	02°25′16″	055°07′30″
12	*Pithecia mittermeieri*	Marsh (2014)	Rio Arapiuns, Aruá (Olalla collection, by gazetteer, Paynter Jr. & Traylor Jr. 1991)	02°39′	055°37′59″
16	*Pithecia mittermeieri*	Marsh (2014)	Limoal near Boim (Olalla collection, by gazetteer, Paynter Jr. & Traylor Jr. 1991)	02°43′05″	055°13′23″
14	*Pithecia mittermeieri*	Marsh (2014)	Parintins	02°37′12″	056°52′48″
15	*Pithecia mittermeieri*	Marsh (2014)	Rio Andira	02°46′12″	057°03′36″
16	*Pithecia mittermeieri*	Marsh (2014)	Lago Andira	02°45′	057°09′36″
17	*Pithecia mittermeieri*	Marsh (2014)	Itaituba, Villa Braga	04°25′00″	056°16′59″
18	*Pithecia mittermeieri*	Marsh (2014)	Igarapé Auara (Olalla collection, by gazetteer, Paynter Jr. & Traylor Jr.1991)	04°17′13″	059°25′48″
19	*Pithecia mittermeieri*	Marsh (2014)	Borba	04°24′00″	059°34′59″
20	*Pithecia mittermeieri*	Marsh (2014)	Rio Aripuanã	05°11′38″	060°23′35″
21	*Pithecia mittermeieri*	Marsh (2014)	Lago do Cipotuba	05°32′06″	060°22′23″
22	*Pithecia mittermeieri*	Marsh (2014)	Humaitá	07°25′44″	063°00′07″
23	*Pithecia mittermeieri*	Marsh (2014)	Destacamento do Ribeirão (Natterer 1883)	10°15′	065°16′
24	*Pithecia mittermeieri*	Marsh (2014)	Rio Pacáas Novos (Natterer 1829)	10°48′07″	065°07′41″
25	*Pithecia mittermeieri*	Marsh (2014)	Nova Brasília (Polonoreste 1985)	10°44′24″	061°58′12″
26	*Pithecia mittermeieri*	Marsh (2014)	Cacoal State Park	11°09′	061°34′
27	*Pithecia mittermeieri*	Marsh (2014)	Chupinguala	12°	061°
28	*Pithecia mittermeieri*	Marsh (2014)	Retiro do Veado Branco, Serra do Norte (Comissão Rondon)	11°19′59″	059°
29	*Pithecia mittermeieri*	Marsh (2014)	Km 16 on BR 230 (approx.)	07°32′17″	062°44′53″
30	*Pithecia mittermeieri*	Gusmão & Santos-Silva (2015)	Tangará da Serra, Mato Grosso	14°35′23″	057°24′27″
31	*Pithecia mittermeieri*	Gusmão et al. (2014)	RPPN Água Boa, Rondônia	11°29′17,14″	061°26′20,23″
32	*Pithecia mittermeieri*	Sampaio et al. (2012)	Bras-Norte, Mato Grosso	12°32′	057°52′
33	*Pithecia mittermeieri*	Sampaio et al. (2012)	Vila Bela da Santíssima Trindade, Mato Grosso	15°01′	059°37′
34	*Pithecia mittermeieri*	Present study	Lambari D'Oeste, Mato Grosso	15°11′42″	057°44′43″

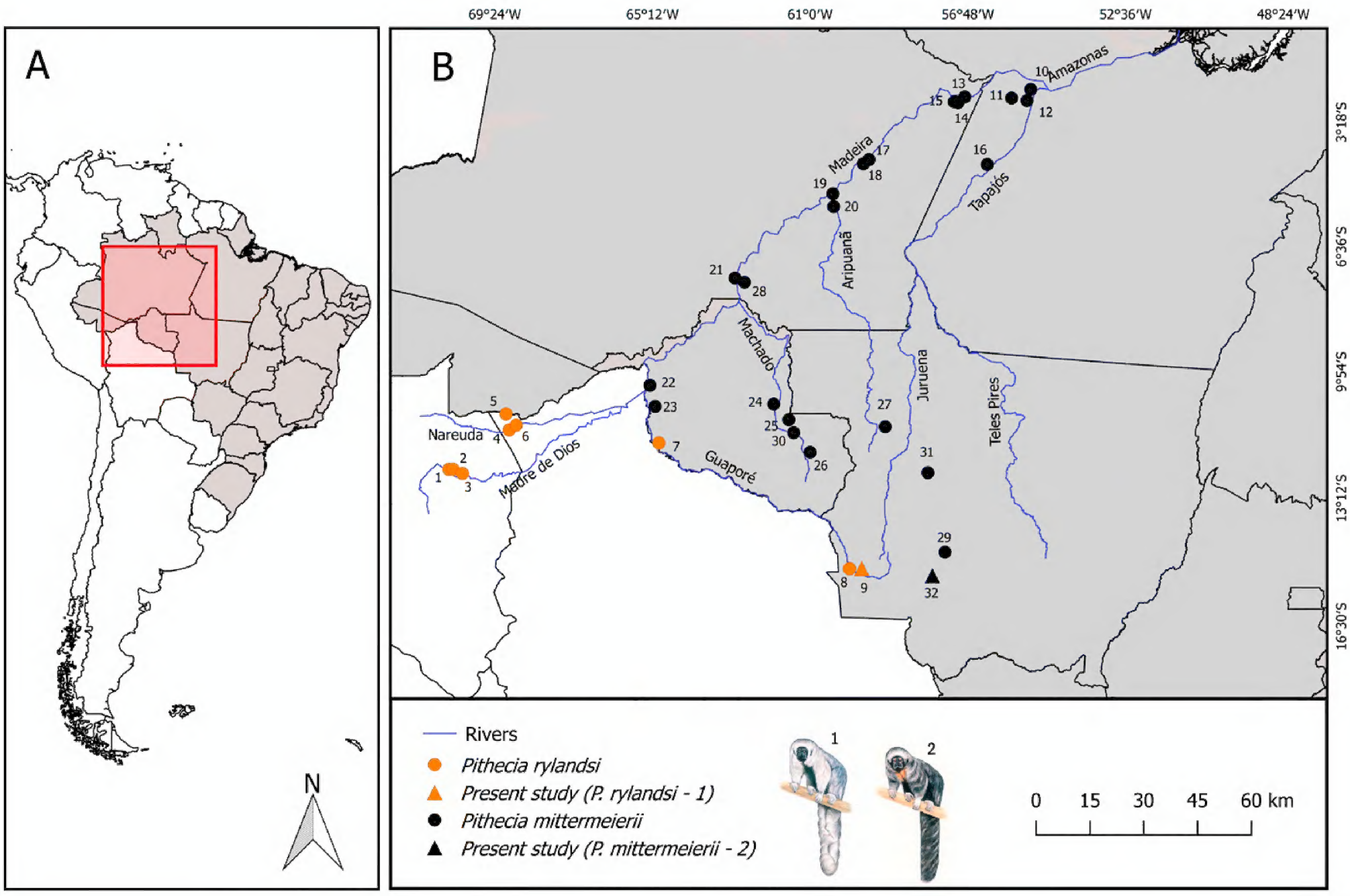

Figure 3. An updated distribution map of (1) *Pithecia rylandsi* (Primates, Pitheciidae) and (2) *Pithecia mittermeieri* (Primates, Pitheciidae). **A.** Overview of the South America, showing the area of study. **B.** Highlights the sites of new records for both species of *Pithecia* in the state of Mato Grosso in Brazil, according to published data and the present work. For locality data see Table 1.

as they age becomes almost entirely white. On the other hand, *Pithecia mittermeieri* has a distinct characteristic from all other sakis: males present a bright orange ruff on the chest. We observed only two females in the fragment and identification was based on their pelage. The subadult females had very black fur around the face with lots of hair and very little stippling. Some females of *P. mittermeieri* are known to have very hairy faces in comparison to the females of *P. rylandsi* (Marsh 2014).

Our record for *P. rylandsi* confirms the presence of this species in the state of Mato Grosso, as the last and only record for this species in this state was made by Natterer in 1829 (Marsh 2014) (Table 1). This fact extends the distribution of this species about 34 km southeast from its previously determined southern limit in the state of Mato Grosso proposed by Marsh (2014) (Figure 3). The records of this species of saki monkey were limited to west and north of the Guaporé River (Marsh 2014), with the new record occurring in the southern part of this river, suggesting that the Guaporé River may not represent a major geographical barrier for medium-sized and large primates, as reported by Nunes (2014). During the dry season, beaches are formed in the Guaporé River over its meandering fluvial channel. Such factors may explain why the species is present on both margins of this river (Souza-Filho et al. 1999). Another factor that could allow sakis and other primates to cross over to the opposite margins of a river is its configuration. In this context, sand banks along margins and a sinuous form of the river make this type of event possible (Ayres & Clutton-Brock 1992).

For *P. mittermeieri*, our record was 76 km south of the nearest known locality, which is in the municipality of Tangará da Serra, in the state of Mato Grosso (Figure 3) (Gusmão and Santos-Silva 2015) (Table 1). Currently, this new record is the southernmost record known for the genus and in an ecotone region of Amazon, Cerrado, and Pantanal biomes (Ferreira et al. 2005).

The forest fragments where both species were recorded are located in a landscape that has been significantly altered by human activities over the past few decades. Currently, these areas are composed of a homogeneous agricultural matrix, which consists of soybean plantations and livestock (Sampaio et al. 2012). This area is close to the "Arc of Deforestation", which extends from southeastern Maranhão state to southern Acre state, and has the highest deforestation rates of the entire Brazilian Amazon (Ferreira et al. 2005; Metzger 2001; Michalski et al. 2008). In this context, it is crucial to emphasize the importance of these areas (located both in Rondônia and Mato Grosso) (Table 1), for the conservation of *P. mittermeieri*,

since these states present a large part of this species known distribution (Gusmão & Santos-Silva 2015).

Defining the ranges of both *P. rylandsi* and *P. mittermeieri* is critical for assessing their conservation status. Indeed, there is a lack of information about the ecology, behavior, group size, and range of both of these species. Since they currently are found in severely altered habitats, it is important to follow up sightings, like the ones herein, with intentional field studies to better understand these species.

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